

# INSTRUCTION MANUAL



MODEL  
**666/606**

## DYNA-JET TUBE TESTER



Product of DYNASCAN CORPORATION  
1801 West Belle Plaine Avenue, Chicago, Illinois 60613



Dear Friend:

Congratulations on your purchase of B & K—Precision Test Equipment, and welcome to the B & K family. We hope your experience with your new test equipment will make you a lifetime B & K customer.

Your instrument is backed by more than 20 years of experience in designing and manufacturing. Our most important goal is your satisfaction. At B & K, test equipment is made to meet the demands of the field focusing on dependability and accuracy. We also concentrate on simplicity and operating ease with features that reduce the possibility of human error and speed the servicing process.

In order to determine the type of test units that are needed we have been guided by letters and reports from technicians and engineers who use the equipment daily. Our field tests and studies have helped provide better and faster service techniques. Close contact has been maintained with the manufacturers of consumer products which our test units will be checking and trouble-shooting.

Key personnel in our company cut their eye teeth in the TV service business. This is why we have more "sensitivity" for the problems and conditions under which the test equipment will be used.

B & K product designs are constantly reviewed, and refinements are made or new models developed to meet advances in our industry and to fill your needs. We set our standards high so you can be assured that the B & K test instruments you buy represent advanced design, quality construction, and dependable long-term performance at a price you can afford.

If you have any comments or thoughts about our products, or test equipment in general, I would be delighted to hear from you.

Thanks for your confidence in B & K and we look forward to serving you for a long time to come.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Carl Korn'. The signature is fluid and cursive, with a long horizontal stroke at the end.

Carl Korn  
President

# **OPERATING INSTRUCTIONS**

**FOR**

**Model 666/606**

**DYNA-JET**

**TUBE TESTER**

**B & K DIVISION OF DYNASCAN CORP.**

**1801 West Belle Plaine Avenue**

**Chicago, Illinois 60613**

# MODEL 666/606 TUBE TESTER

## *What It Will Do*

1. The Dyna Jet Model 666/606 Tube Tester will test all of the commonly used tubes in general use in radio and television sets.
2. In addition it will test many voltage regulator tubes, thyatron tubes, industrial types of tubes and many of the European types found in modern hi fi equipment.
3. Each tube is automatically checked for shorts and leakage to approximately one megohm. These tests are made from each element to every other element so that all possible combinations of shorts can be detected.
4. Grid Emission, Gas, Grid Contamination, or obscure Grid to Cathode leakage are all disclosed by an exceptionally sensitive grid current check. This test will reveal as little as 2 to 3 microamperes of current in the grid circuit and can be adjusted for a sensitivity of over 100 megohms.
5. Each section of a multi section tube is checked separately.
6. Each tube is checked for quality in a test circuit that determines the full capability of cathode emission under current loads simulating actual operating conditions.

## *Testing Tubes for Shorts*

The Shorts check is automatically made when a tube is placed in the proper socket.

The Shorts check uses a neon lamp as the indicator. Shorts or leakages to approximately 1 megohm will cause this lamp to glow. This Shorts indicator is located just below the meter

A check on grid to cathode leakage is made as soon as the tube is plugged into the socket. The Shorts check between all other elements is made by rotating the switch "C" through its positions, observing the Shorts light as the switch is rotated.

## *Testing Tubes for Quality*

The test for the quality of a tube is a comprehensive cathode emission test. It is important to test the tube under a load condition which will insure that a tube passing this test will have adequate emission to properly operate in a circuit.

## TESTING TUBES FOR GRID EMISSION AND GAS

The Grid Emission and Gas Test is an invaluable aid in TV servicing because it quickly picks out those tubes which can cause trouble in a.g.c., sync, I.F. amplifier, and R.F. tuner circuits.

In order to understand how a tube can have "grid emission" and "gas current" we must look into the theory of electron tubes.

There is normally some little evaporation of the cathode coating material on the grid of a tube. Some of this vapor tends to deposit on the grid and gives rise to what is known as "grid emission", where the grid itself emits electrons and draws current commonly known as "negative grid current". The flow of this "negative grid current" can be followed in Figure 2.

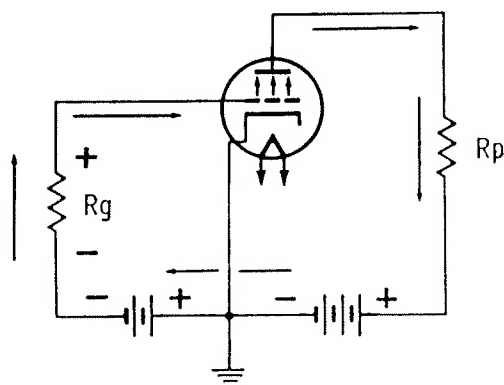


Figure 2  
Negative Grid Current.

The electrons flow from the grid to the plate then back through the power supply to the grid leak resistor  $R_g$  and up to the grid again. Notice that the voltage drop across the grid leak resistor  $R_g$  is such that it causes the grid to go more positive than it normally would with no grid emission.

If a slight amount of "gas" is present in a tube some of the electrons from the cathode will collide with molecules of the gas and may knock off one or more electrons, leaving positive ions (ionization). Some of these positive ions may then strike the grid, taking an electron from the grid to form a gas molecule again. The electron flow of this "gas current" is exactly the same as it is for the "grid emission current" and can be traced on Figure 2. Notice again that the grid is made more positive by this "gas current".

Now let us see what happens if an I.F. amplifier tube in a TV set has grid emission current or gas current (negative grid current). In Figure 2 we noted that the grid would tend to go more positive if negative grid current flowed.

In Figure 3, a typical I.F. stage, we see that if there is any negative grid current, the bias voltage in that stage and other associated stages will go more positive because of the flow of current through R1. Making the grid more positive will drive the tubes to saturation, causing clipping or overloading.

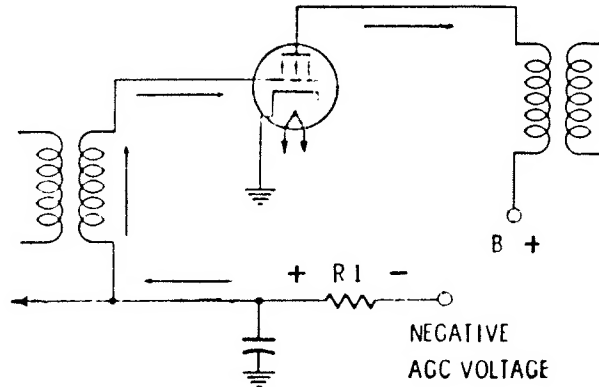


Figure 3  
Typical I.F. Stage.

After detection, a video signal normally appears as shown in Figure 4. If the signal is clipped in an I.F. stage it will look like Figure 5. Now the horizontal oscillator will try to synchronize both on the blanking signal (A) and on the very black portions of the video (B). This results in pulling or snaking of the picture.



Figure 4  
Normal Video and Sync Signal.



Figure 5  
Overloaded or Clipped Video and Sync Signal.

To achieve this sensitive grid emission or gas test, the circuit shown in Figure 6 was employed.

The tube under test has its normal plate to grid voltage applied, but the grid is biased beyond cut-off so that no plate current flows. This bias is applied through the 5.6 megohm resistor. The same 5.6 megohm resistor is also in the grid circuit of a 6BN8 d.c. amplifier and the conditions in this tube are

such that it, too, is biased just beyond cut-off. Under these conditions, no plate current flows in the 6BN8 and no reading is obtained on the meter in its plate circuit.

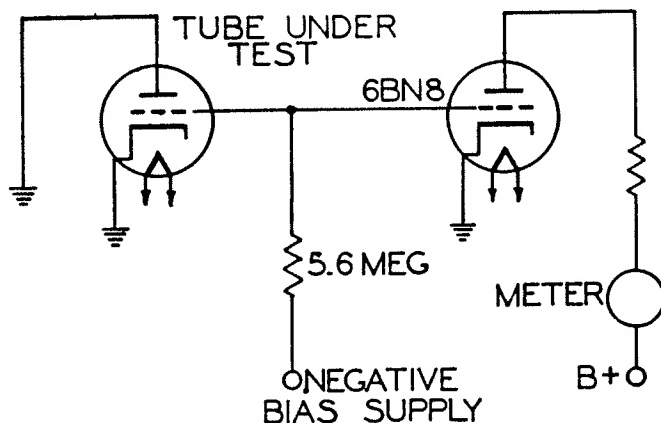


Figure 6—Grid Emission Test Circuit.

However, if the tube under test is gaseous, or its grid is contaminated with some of the cathode coating, then current will flow from grid to plate and through the 5.6 meg resistor back to the grid again. This will produce a positive voltage drop across the 5.6 meg resistor, lifting the cut-off bias on the 6BN8 and producing a meter deflection. Upon seeing this deflection, the technician immediately knows that the test tube is defective and a replacement is indicated.

## HOW TO OPERATE THE DYNA JET MODEL 666/606 TUBE TESTER

### *Simplified Instructions*

1. Look up tube in chart.
2. Set Heater to voltage indicated in Heater column of chart.
3. Set "A", "B" and "C" controls to positions indicated on chart.
4. Insert tube into proper socket as indicated on chart.
5. Allow tube to warm up and observe Shorts indicator. If Shorts light glows, reject tube.
6. Depress Grid Emission button. Any deflection of the meter pointer into the "Grid Emission-Reject" area of the scale is cause for reject of the tube.
7. Depress Quality button. Tube will read on the Good-Bad scale of the meter.
8. To test for all other shorts rotate Switch "C" through each of its positions and observe Shorts lamp. (The Shorts lamp may glow instantaneously while rotating switch "C" through its position. This is due to a capacitor discharge and is to be ignored.)

## TEST PROCEDURE

The Model 666/606 Tube Tester is designed for use at 105-125 volts, 50-60 cycle A.C. only. The instrument is turned on and ready for use merely by inserting the line cord into an A.C. socket. The first step in the testing of a tube is to look up this tube in the chart contained in the cover of the instrument. Let us take a typical example such as a 6AU6. Fig. 7 shows a typical listing for this type. The heater voltage for this tube type is 6, as shown, and the heater switch must therefore be set to the 6 volt position. This will then apply the correct heater voltage to the tube under test.

Tube Type	Heater	"A"	"B"	"C"	Socket No.
6AU6	6	33	6	1	1

Figure 7.

If the tube in question had a 17 volt heater, the heater switch will be rotated to the 15-20 position. Any tube with a heater voltage between 15-20 volts is tested with the heater switch in this position.

**CAUTION! THE HEATER SWITCH MUST BE SET TO THE CORRECT FILAMENT VOLTAGE BEFORE INSERTING THE TUBE IN THE SOCKET. FAILURE TO OBSERVE THIS PRECAUTION MAY RESULT IN BURNING OUT THE FILAMENT OF THE TUBE.**

The "A" control is set to 33, the "B" switch placed in position 6, and the "C" switch in position 1. The tube is now inserted into socket No. 1, as shown in the last column of the type listing in Fig. 7. The tube is automatically tested for grid to cathode shorts and leakage as soon as the tube is inserted into the socket.

To test for grid emission, depress the Grid Emission button. Any deflection of the meter pointer into the "grid emission-reject" area of the meter scale indicates a defective tube. This tube should be discarded. If the tube passes the Grid Emission test, we then proceed to the Quality test.

The tube is tested for Quality by depressing the Quality button and observing the Good-Bad reading on the meter scale. A few tube types do not normally register a meter reading into the "Good" area because of our exceptionally critical Quality test. For these types the chart indicates the minimum numerical reading that this tube must have to be acceptable.

The tube can be tested for shorts or leakage between any of the other elements by rotating switch "C" through each of its positions. If the Shorts indicator neon lamp glows in any of the switch positions of switch "C", the tube should be rejected. (As the switch is rotated from one position to the next, the shorts indicator may instantaneously glow due to a capacitor discharge. This is to be ignored.)

Certain tube types have more than one pin connection for a given element, therefore the Short indicator lamp may normally glow in certain positions of Switch "C", even if there is no short in the tube. The chart will indicate where this "normal" short indication will occur. These tubes should not be rejected for these normal shorts.

This completes the test on the tube.



If the tube was multi section tube, there would be a second and possibly a third list of settings on the chart to test the additional sections. See Fig. 8.

Tube Type	Heater	"A"	"B"	"C"	Socket No.
6BN8	6	35	6	8	2
	6	35	6	1	2
	6	35	6	6	2

Figure 8.

## SERVICE INSTRUCTIONS

The sensitivity of the grid emission test circuit is adjusted at the factory so that a leakage of 25 megohms just reads in the "Grid Emission-Reject" area on the meter scale. This order of sensitivity is the level that tube manufacturers recommend, in order not to reject good tubes. The adjustment of this sensitivity is a screwdriver adjustment available through a small opening just above and to the right of the Quality button. This adjustment is made in the following manner.

Place switch "B" to position 6, and switch "C" to position 1. Connect a 20 megohm resistor between Pins 1 and 7 of socket No. 1, push Grid Emission button, adjust the control for a reading of 20 on the meter. If you wish to make the Grid Emission test at greatly increased sensitivity, the following adjustment will give you a sensitivity in excess of 100 megohms. Place switch "B" in position 6 and switch "C" to position 1, push Grid Emission button and with no resistor in the socket adjust the Grid Emission Sensitivity Control so that the meter just reads zero.

This instrument has an internal adjustment for sensitivity of the short test circuit. This control has been set at the factory for a nominal 1 megohm sensitivity. This should be checked occasionally by placing a 1 megohm resistor between pin #3 and pin #8 of socket #8 with the B switch at 6 and the C switch at 3. Should this sensitivity control require re-adjusting, proceed in the following manner:

1. Remove panel from case.
2. Locate short sensitivity control which is across the short lite socket base.
3. Place 1 meg external resistor in test socket as outlined above. Rotate control so that the short lite just comes on, starting from end of control where lite is out.
4. Re-assemble tester, be sure to remove 1 meg resistor before testing tube.

The enclosed schematic diagram shows all voltage readings for the instrument and the parts list is printed on the back of the schematic diagram.

In order to keep your tube chart up to date, it is recommended that you subscribe to the B & K chart mailing service.

## **WARRANTY SERVICE INSTRUCTIONS**

1. Refer to the instruction manual for adjustments that may be applicable.
2. Check common electronic parts such as tubes. Always check instruction manual for applicable adjustments after such replacement.
3. Defective parts removed from units which are within the warranty period should be sent to the factory prepaid with model and serial number of product from which removed and date of product purchase. These parts will be exchanged at no charge.
4. If the above mentioned procedures do not correct the difficulty, pack the product securely (preferably double packed). A detailed list of troubles encountered must be enclosed as well as your name and address. Forward prepaid (express preferred) to the nearest B&K authorized service agency.

Contact your local B&K Distributor for the name and location of your nearest service agency, or write to

### ***Service Department***

**B & K** DIVISION OF DYNASCAN CORPORATION

2815 Irving Park Road

Chicago, Illinois 60618

## WARRANTY

"B & K warrants that each product manufactured by it will be free from defects in material and workmanship under normal usage and service for a period of ninety days after its purchase new from an authorized B & K distributor. Our obligation under this warranty is limited to repairing, or replacing any product or component which we are satisfied does not conform with the foregoing warranty and which is returned to our factory or our authorized service contractor, transportation prepaid, and we shall not otherwise be liable for any damages, consequential or otherwise. *The foregoing warranty is exclusive and in lieu of all other warranties (including any warranty of merchantability), whether expressed or implied.* Such warranty shall not apply to any product or component (i) repaired or altered by anyone other than B & K or its authorized service contractor (except normal tube replacement) without B & K's prior written approval; (ii) tampered with or altered in any way or subjected to misuse, negligence or accident; (iii) which has the serial number altered, defaced or removed; or (iv) which has been improperly connected, installed or adjusted otherwise than in accordance with B & K's instructions. B & K reserves the right to discontinue any model at any time or change specifications or design without notice and without incurring any obligation. *The warranty shall be void and there shall be no warranty of any product or component if a B & K warranty registration card is not properly completed and postmarked to the B & K factory within five days after the purchase of the product new from an authorized B & K distributor.*"



DYNASCAN CORPORATION

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